Qualitrol T/Guard-405 System

Fiber Optic Power Transformer Winding Temperature Monitoring System

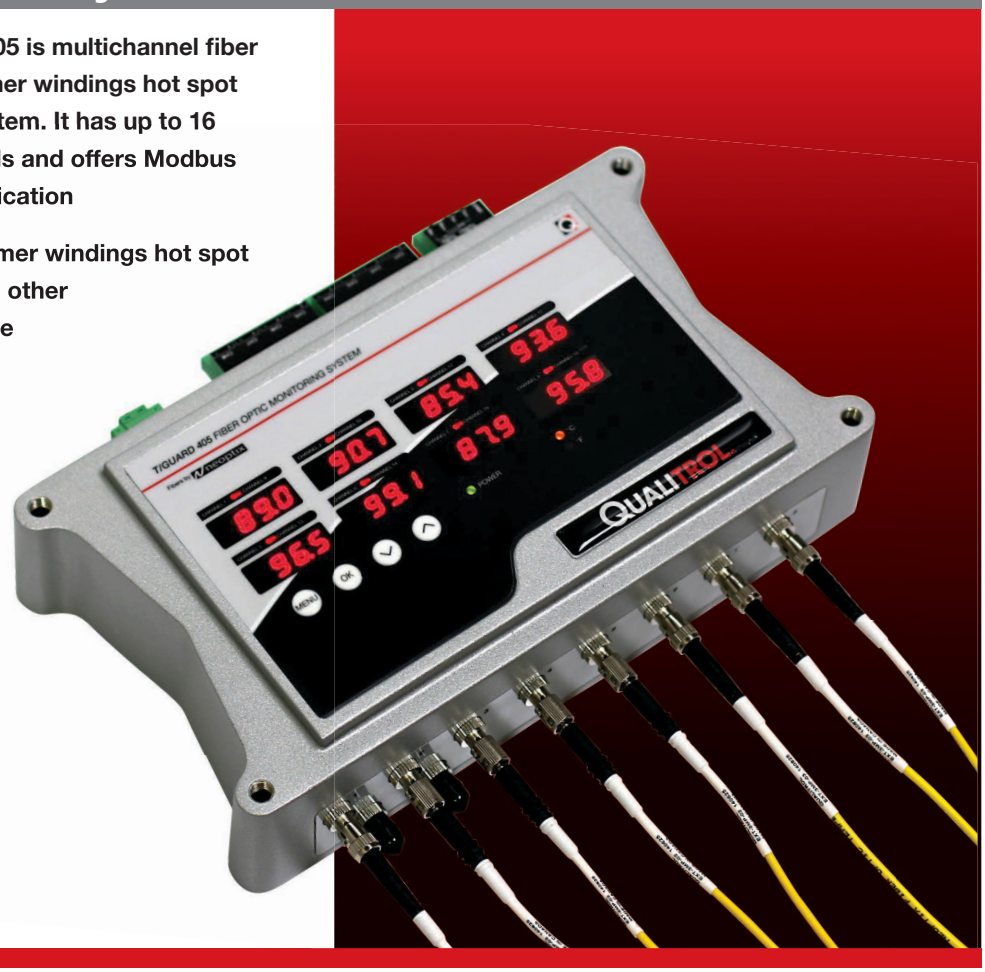
A multichannel fiber optic system for high voltage and transformer hot spot temperature monitoring

- Tough and ruggedized sensors
- No gage factor or calibration required
- RS-485, Modbus communication
- 4-20 mA analog outputs
- Accuracy of ±1°C
- Resolution of ± 0.1 °C
- Detachable connector blocks
- On-board 32 MB memory
- Highly visible LED display
- Extended operating temperature
- Compatibility with serial Smart protocols
- Available with 2 to 16 channels

Product Summary

Description The T/Guard-405 is multichannel fiber optic transformer windings hot spot monitoring system. It has up to 16 optical channels and offers Modbus serial communication

Application Direct transformer windings hot spot monitoring and other general purpose monitoring applications



Fibers by neoptix

QUALITROL®
Defining Reliability

- The Qualitrol™ T/Guard-405™is a multi-channel fiber optic temperature monitoring system for power transformer hot spot measurements. The T/Guard system has been developed with long-term performance and stability in mind. This fiber-optic temperature monitoring system for power transformers offers accuracy, toughness and long-term resistance to failure.

- Coupled with the T/Guard system, the Neoptix™ T2™ fiber-optic temperature probe provides accurate and direct temperature monitoring of transformer windings. This solution provides a realistic, real-time view of winding conditions that is quicker and more accurate than top oil thermocouple or RTD measurements, and greatly complements indirect measurements based on thermal models.

- Qualitrol T/Guard gives the exact temperature of optical probes in 250 milliseconds per channel. Peak load or emergency overloads are thus detected almost instantaneously.

- The 405 system is specifically designed to meet power transformer industry requirements: extended intervals between servicing, low maintenance, rugged components and the ability to withstand the harshest conditions. All components have been specifically selected for long term performance, including the light source that has an MTBF superior (>300 years of use) to the expected life of the transformer. Moreover, compared to other technologies available on the market, like fluorescent decay, our sensor, based on solid state semi-conductor, do not fade or drift over time, allowing a constant and absolute temperature measurement of your transformer windings over the lifespan of the equipment.

- Our fiber-optic probes are made only with dielectric materials and are designed to withstand initial manufacturing conditions, including kerosene desorption and heat runs, as well as long term oil immersion and vibration. Moreover, the Neoptix temperature probes are interchangeable and no calibration or inconvenient gage factors are required when changing sensors.

- The system is based on the proven GaAs technology. An original algorithm is used to analyze the signal and provides repeatable and reproducible measurements. The T/Guard system is available with 2 to 16 optical channels and comes standard with a large LED display that allows easy viewing from a distance. Power consumption of the system is 15 watts.

- The mounting brackets are integrated directly into the T/Guard enclosure, which allow a clean and robust installation into your control cabinet or substation. It is optionally available mounted in a NEMA4-12 enclosure. Automatic cooling and heating can be ordered with this protective enclosure.

- The 405 system comes standard with a 32 Megabytes on-board datalogging memory that allows utilities and transformer operators to record temperature data points and alarm status information directly into their T/Guard temperature monitoring system, without the need for permanent connection to a remote acquisition system. The T/Guard option is delivered with a 32 MB memory size, which is sufficient to log ~9 years of data sampled every 10 minutes. The T/Guard system is a completely independent monitoring solution and the logged file can be retrieved by a PC using RS-485 serial communication. Data points are saved with time stamps that come from the internal real-time clock of the T/Guard system.

- The T/Guard system is easy to interface to an existing marshaling or substation system via its 4-20 mA analog outputs or its Modbus communication interface. It also has RS-485 communication. When used with the optional Qualitrol OptiLink-II™ software on the serial port, the T/Guard becomes an indispensable monitoring instrument.

Accessories

T2™ Temperature probe

This temperature probe is designed to withstand initial manufacturing conditions, including kerosene desorption and heat runs, as well as long term oil immersion and vibration. The T2 probe consists of a 300-microns OD solid-state crystal and optical fiber sheathed with an oil permeable protective PTFE Teflon sheath. Only chemical resistant dielectric materials are used for these temperature probes. The temperature range is -80 °C to +250 °C. The probes can be embedded in a standard spacer or attached directly onto any other location inside power transformer copper windings. All T2 optical temperature probes are available in custom lengths from 1 to 25 meters.

Tank wall optical feedthrough

Specifically designed for tank wall transformers, this feedthrough has a simple design that provides both toughness and long-term leak-free operation. It is made from 316 stainless steel and relies on proven glass-to-metal bonding techniques. The feedthrough uses 1/4" NPT ANSI threads and can be installed directly into the tank wall or on a tank wall mounting plate. No O-rings are used.

External fiber-optic extension cables

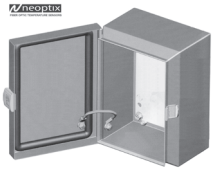
These cables are made with a polyurethane jacket reinforced with Kevlar threads and are designed to withstand the harshest conditions. External fiber-optic extension cables come in standard 5 or 10 meter lengths. Custom lengths are also available from 1 meter to 1 kilometer. The temperature range is -50 °C to + 85 °C. Cables should be routed into protective conduits or tracks.

Tank wall mounting plate & JBox

Up to 24 feedthroughs can be mounted on a tank wall mounting plate. The plate is made with carbon or stainless steel 316. Tank wall mounting plates can be customized in size or material according to customer specifications, with larger plates allowing more feedthroughs. As an option, the mounting plate comes with the JBox™ protective enclosure.

NEMA-4 Enclosure

The T/Guard system can be mounted in a NEMA-4 enclosure that houses and protects the instrument for long-term exterior use. All fiber-optic extension cables are connected inside this enclosure. The NEMA-4 enclosure includes a clear polycarbonate window-door and is compliant with NEMA/EEMAC Type 4 and 12 standards.



OptiLink-II software

OptiLink-II is a user-friendly software that allows to interface your 405 to a Windows PC, via its serial port. It adds the following capabilities to your system:

- Supports up to 4 T/Guards (different models) and up to 64 channels
- Does data logging, directly to an Excel spreadsheet
- Displays and graphs (2D and 3D) on your PC screen up to 64 channels
- Allows to configure your 405 without remembering tedious serial commands
- The next best feature after a web server
- Can download and upload files, such as a firmware upgrade, temperature log files, the status file, etc.

TECHNICAL SPECIFICATIONS		
System	Model	T/Guard-405™ System
	Number of channels	Available with 2 to 16 channels (2, 4, 6, 8, 10, 12, 14 and 16 channels)
	Resolution	0.1 °C (0.2 °F)
	Accuracy	±1 °C (1.6 °F)
	Response time	250 milliseconds
	Operating temperature	-40 to 72 °C; non-condensing
	Storage temperature	-40 to 85 °C; non-condensing
	Display	LED display
	Units	User selectable; Metric or Imperial
	Datalogging	32 MB internal memory
	Communication port	RS-485 Modbus
	Operating Mode	RS-485: OptiLink™ and OptiLink-II PC Software or ASCII commands; Modbus;
	Analog outputs	Standard: 4-20 mA (one output per optical channel)
	Calibration	No system recalibration needed over lifespan to remain within specifications
	Light source MTBF	> 300 years of use
	Probe compatibility	All Neoptix temperature probes
	Power requirements	20 to 48 VDC
	Conducted/Radiated Emissions, surge withstand and environmental	IEC 61000-4-2 ESD IEC 61000-4-3 Radiated RFI IEC 61000-4-4 Burst IEC 61000-4-5 Surge IEC 61000-4-6 Induced (Conducted) RFI IEC 60068-2-14 Temperature -40 to +72 °C IEEE C37.90 Dielectric strength (high pot) IEEE C37.90.1-2002 Fast transient IEEE C37.90.1-2002 Oscillatory FCC 47 CFR Part 15, Sub B ICES-003 Issue 4, Feb 2004
	Power consumption	15 Watts Max
	Dimensions	Width: 148 mm; Height: 62 mm; Length: 265 mm
	Weight	1.6 kg
	Warranty	5 years Limited International warranty; Extended warranty available
	Ordering Codes	405 - ☐☐ - SP ☐ **Number of channels:** 02 = 2 channels n = n channels 16 = 16 channels (even number of channels only) **Serial com protocols** 0 = ASCII and Modbus (standard) 1 = ENHANCED: Includes DNP 3.0 and IEC 60870-5-101
	Options for the 405	RS-485 to USB bridge - Neoptix part number NXP-341

QUALITROL® Field Services

QUALITROL® provides on-site commissioning /start-up and comprehensive maintenance contracts to all customers worldwide. To further improve reliability, an extended warranty is available on selected products commissioned by QUALITROL®.

About QUALITROL®

QUALITROL® manufactures substation and transformer monitoring and protection devices used by electric utilities and manufacturing companies. It is the global leader in sales and installations of transformer asset protection equipment, fault recorders, and fault locators. Established in 1945, QUALITROL® produces thousands of different types of products on demand, each customized to customers' unique requirements.

Email: info@qualitrolcorp.com
www.qualitrolcorp.com